Occupancy Grid Based Robot Navigation with Sonar and Camera

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Autonomous mobile robots is a young interdisciplinary scientific field of growing importance with strong connections to electronics engineering, informatics and cognitive sciences ([5]). Development in this domain will substantially influance our lives in the near future.

Mobile robot simulators offers rapid prototyping environment for modelling, programming, and analizing different robotic tasks. Although difficulties and drawbacks are arising when using simulators, their obvious advantages make them unavoidable ([4]). Webots ([1]) is a well-known representant of these programs, a three-dimensional mobile robot simulator with the possibility to program and control various type of wheeled and legged robots.

At CSCS 2002 the author presented a metric navigation module using occupancy grid in the Webots mobile robot simulation environment ([2]). During this task the robot covers the surface of square-shaped environment while it creates the map. As a continuation of the research a topological graph is placed on top of occupancy grid. The implementation of a topologic graph of the explorable places using the metric map enables the robot to navigate in a more efficient manner as it was presented at CSCS 2004 ([3]).

During this talk the author presents an extension of the former methods. An on-top camera complement the perception of the sonar sensors determining obstacle distance by floor plane extraction ([6]). Efficiency of the three methods is compared and conclusions are drawn about their usefulness.

Keywords: *mobile robots, simulation, navigation, occupancy grid, topological graph, image processing*

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